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(54) Title: **SYSTEM FOR BROADCASTING SOFTWARE APPLICATIONS AND PORTABLE DATA COMMUNICATIONS DEVICE FOR USE IN SUCH A SYSTEM**

(57) Abstract: A communications system consisting of a server system that stores software applications, a broadcast system that broadcasts the software applications, and a multiplicity of portable clients that each include a receiver having a tuner that is selectively tunable to receive a selected one of the software applications broadcasted by the broadcast system. The portable clients can be any type of portable data communications device, such as a hand-held, palm-top, or notebook computing device, a PDA, an intelligent cellular phone, or any other personal multimedia appliance or Network Computer (NC). The broadcast system can be any suitable satellite or terrestrial air or cable broadcast system. For example, a CATV broadcast network, a DBS broadcast network, an HDTV broadcast network, or other appropriate broadcast network could be utilized. The software applications can consist of a broad spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like. Each of the portable data communications devices includes a receiver that has a tuner that is selectively tunable to receive a selected one of a plurality of software applications broadcasted by a broadcast system, a user-interface that enables a user to select one of the broadcasted software applications for downloading, a processor for executing the downloaded software applications, and a modem for establishing a two-way communications link with a network control system. The two-way communications link includes a forward channel over which the portable data communications device can transmit client data to the network control system, and a return channel over which the network control system can transmit system data to the portable data communications device. The client data can include requests for unrecoverable software application data and client software download request data. The system data can include instructions for supervising the downloading of software applications, unrecoverable software application data, and download control data issued in response to the client software download request data. In one embodiment, the broadcast system broadcasts the software applications over different channels each occupying a different respective frequency band, and the tuner is selectively tunable to any selected one of the plurality of different frequency bands in order to receive the selected one of the broadcasted software applications.

WO 01/31846 A2

System for broadcasting software applications and portable data communications device for use in such a system.

BACKGROUND OF THE INVENTION

The present invention relates generally to the field of data communications, and more particularly, to the field of portable data communications devices.

The recent explosive growth of the Internet has given rise to the concept of "Network Computing". The basic idea of Network Computing is to store data and software applications on remote computers ("servers") rather than locally on user's computers ("clients"), with the clients only downloading the data and/or software applications from a server(s) on which they reside, as they are needed, thus dispensing with or greatly minimizing the client's memory and hard-disk drive resources. The clients in this Network Computing paradigm are sometimes referred to as "Network Computers" (NCs), or "thin clients". Ideally, all software applications and user data would be stored in secure, fault-tolerant, scalable servers and associated mass storage devices (e.g., Redundant Arrays of Inexpensive Drives - - RAIDs), thereby completely eliminating the need for individual computer users to purchase, install, maintain, upgrade, and replace individual software applications and/or operating systems, and completely eliminating the need for individual computer users to store and back-up their data files.

Many, including large companies such as Oracle, Sun Microsystems, and IBM, have promoted a particular instantiation of this "network centric" paradigm in which all software applications are written in the Java programming language, and served in the form of Java "applets", to thereby enable real-time execution of any selected software application on any type of computer (mainframe, PC, laptop, etc.) running on any type of computer platform or operating system (e.g., Microsoft Windows, Apple Macintosh, Unix, etc.). In short, each client would be "Java-enabled", and could thus be regarded as a "Java virtual machine". Since Java is an open, hardware-independent, cross-platform ("open") programming language, the result would be that all clients would be capable of executing any software application. This "universal" client-server model is now regarded by many as the "holy grail" of the computing world.

Ideally, the user should be unaware that he/she is not working with a computer having little or no local storage and no resident software applications. However, this is only possible if the client has a continuous, broadband connection to the network (e.g., a private Intranet and/or the public Internet). While this is feasible in some professional and commercial settings, it is not generally feasible for the average home user/personal consumer. The typical PC user only has a narrowband connection, via telephone modem, to the Internet.

Moreover, recent dramatic technological advancements in the fields of computers, software, semiconductors, and communications have led to a proliferation of products that are capable of real-time processing of digitized streams of multiple data types, such as audio, video, graphics, and communications data streams. Such products are commonly referred to as "multimedia products". These multimedia products include PCs, television set-top boxes, videoconferencing systems, Internet (Web) Browsers, video arcade game systems, consumer video game consoles, and many others. In general, the downloading of multimedia content and software applications demands ever-increasing amounts of bandwidth.

Moreover, there is a pronounced trend towards a convergence of these various multimedia data types, leading to an increased level of integration of multimedia processing capabilities in multimedia products. Further, there is an increasing consumer demand for "personal multimedia products" or "personal multimedia appliances" which are portable (mobile/transportable), and which preferably have at least a wireless mode of operation. Present-generation products of this type include intelligent cellular telephones (such as Nokia's Smart Phone), Personal Digital Assistants (PDAs), such as Philips' Nino and 3Com's Palm Pilot palm-top computing devices, laptop and notebook computers, digital mobile telephony devices for use in Personal Communications Systems (PCS), and the like. Typically, such hand-held devices are equipped (or can be equipped) with a wireless (and/or wireline) modem that enables the user to dial up a narrowband connection to an Integrated Services Digital Network (ISDN), a Public Switched Telephone Network (PSTN), a cellular telephone data network, such as the Cellular Digital Packet Data (CDPD) network, or the like, to enable the user to send and receive e-mail, and/or to surf the Web. In order to run software applications like word processing, video games, spreadsheets, address books, calendars, and the like, these hand-held devices must be equipped with a processor and sufficient memory to store and run these software applications.

It is becoming increasingly apparent that as the variety and complexity of multimedia data increases, the amount of processing power, memory resources, and

communications bandwidth that will be required to transmit and to process this data and to run multimedia software applications will also increase. Inevitably, the line of distinction between a "computer" on the one hand, and a "personal multimedia appliance", on the other hand, will completely blur.

5 It is also becoming increasingly apparent that the amount of communications bandwidth available to personal multimedia appliances, such as hand-held, palm-top, and notebook computing devices, PDAs, and intelligent cellular phones, is much too narrow to enable the real-time downloading and execution of such software applications in accordance with the Network Computing paradigm.

10 However, there is an increasing consumer demand for a personal multimedia appliance that has fully integrated multimedia processing capabilities, that is compact and inexpensive, and that has the capability to run, in real-time, a broad spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like, while preferably also having other capabilities, such as sending and
15 receiving e-mail, surfing the Web, receiving and playing digital video (e.g., MPEG-2 or DVD-quality video) and digital audio (e.g., MP3 or CD-quality audio), and/or cellular telephony.

 The present invention fulfills the need in the art for a portable data communications device that has the capability to download and run, in real-time, a broad
20 spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like, while preferably also having other capabilities, such as sending and receiving e-mail, surfing the Web, receiving and playing digital video (e.g., MPEG-2 or DVD-quality video) and digital audio (e.g., MP3 or CD-quality audio), and/or cellular telephony.

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SUMMARY OF THE INVENTION

 The present invention encompasses, in one of its aspects, a communications system consisting of a server system that stores software applications, a broadcast system that broadcasts the software applications, and a multiplicity of portable clients that each include a
30 receiver having a tuner that is selectively tunable to receive a selected one of the software applications broadcasted by the broadcast system. The portable clients can be any type of portable data communications device, such as a hand-held, palm-top, or notebook computing device, a PDA, an intelligent cellular phone, or any other personal multimedia appliance or Network Computer (NC). The broadcast system can be any suitable satellite or terrestrial air

or cable broadcast system. For example, a CATV broadcast network, a DBS broadcast network, an HDTV broadcast network, or other appropriate broadcast network could be utilized. The software applications can consist of a broad spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like.

Each of the portable data communications devices includes a receiver that has a tuner that is selectively tunable to receive a selected one of a plurality of software applications broadcasted by a broadcast system, a user-interface that enables a user to select one of the broadcasted software applications for downloading, a processor for executing the downloaded software applications, and a modem for establishing a two-way communications link with a network control system.

The two-way communications link includes a forward channel over which the portable data communications device can transmit client data to the network control system, and a return channel over which the network control system can transmit system data to the portable data communications device. The client data can include requests for unrecoverable software application data and client software download request data. The system data can include instructions for supervising the downloading of software applications, unrecoverable software application data, and download control data issued in response to the client software download request data.

In one embodiment, the broadcast system broadcasts the software applications over different channels each occupying a different respective frequency band, and the tuner is selectively tunable to any selected one of the plurality of different frequency bands in order to receive the selected one of the broadcasted software applications.

In another of its aspects, the present invention encompasses the portable data communications devices which are used in the communication system of the present invention.

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BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features, and advantages of the present invention will become readily apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a functional block diagram of a system for broadcasting software applications that embodies one aspect of the present invention; and,

FIG. 2 is a functional block diagram of a portable data communications device that embodies another aspect of the present invention.

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DETAILED DESCRIPTION OF THE INVENTION

With reference now to FIG. 1, an exemplary system 20 for broadcasting software applications that embodies one aspect of the present invention will now be described. As can be seen, the system 20 includes a Network Control Center 30, a satellite 40, and a multiplicity of clients 50. The Network Control Center 30 includes a server system 33, a Network Manager 35, a satellite uplink facility 37, and a modem bank 39. It will be readily appreciated that the various components of the Network Control Center 30 can be physically co-resident in the same facility, or can be distributed and interconnected by any suitable means, e.g., via a Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (WAN), or the like.

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The server system 33 functions to store a plurality of different software applications for broadcast to the multiplicity of clients via the satellite 40. The scheduling, management, and control of the storage, retrieval, and transmission of the software applications is handled by the Network Manager 35, which can suitably be a computer or computer system that is appropriately programmed and operated. The Network Manager 35 preferably supplies the software applications as a continuous data stream over at least one channel to the satellite uplink facility 37, which then modulates the data stream(s) for transmission via one or more uplink data transmission channels to the satellite 40, which in turn amplifies and broadcasts the data stream(s) via one or more downlink data transmission channels.

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It will be readily appreciated by those having ordinary skill in the pertinent art and access to the teachings of the present disclosure that the number of channels dedicated for use for broadcasting software applications is not limiting to the present invention. However, it is presently contemplated that multiple channels will be utilized in order to provide sufficient communications bandwidth to enable the simultaneous broadcast of a broad spectrum of different software applications to a multiplicity of the clients 50 that are simultaneously requesting a diverse suite of software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like. In this regard, as will be described hereinafter, each of the clients 50 preferably has the capability of tuning to any

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selected one of the plurality of different channels over which the software applications are broadcast.

In the illustrative embodiment depicted in FIG. 1, the Network Control Center 30 is equipped with a modem bank 39 that is also under the active management and control of the Network Manager 35 to thereby enable the establishment of a two-way communications link with each of the multiplicity of clients 50, as required. In the illustrative embodiment, the two-way communications link is a full duplex telephone connection, e.g., via a Public Switched Telephone Network (PSTN) 51 and a Cellular Telephone Network (CTN) 53, to each of the multiplicity of clients 50. The two-way communications link includes a forward channel that allows each client 50 to transmit user-specific data and/or requests to the Network Control Center 30, and a return channel that allows the Network Control Center 30 to transmit user-specific data and/or instructions/commands to each client 50, as required.

With reference now to FIG. 2, there can be seen a functional block diagram of a representative one of the clients 50. The client 50 includes a processor 60 on which resides a control program that manages and controls network communications in a manner to be described below. Preferably, the client 50 is Java-enabled, so that it can function as a Java virtual machine, although this is not limiting to the present invention, in its broadest sense. For example, the processor 60 can suitably be a multi-function, multimedia processor such as a Philips Semiconductor TriMedia programmable DSP/CPU that combines a next-generation, programmable microprocessor core with a full set of innovative development tools to simultaneously process full-motion video (e.g., MPEG-2 and DVD digital video), 3-D computer graphics, CD-quality audio, and high-speed data communications data streams. This type of processor is sometimes referred to in the art as a "system-on-a-chip".

The client 50 of the illustrative embodiment depicted in FIG. 2 also includes a receiver module 61 that includes an antenna 63, a tuner/de-modulator 65, a tuner controller 67, and an Analog-to-Digital Converter (ADC) 69. Preferably, the tuner/de-modulator 65 is selectively tunable by the tuner controller 67, which is in turn controlled by the processor 60, to any selected one of a plurality of different frequency bands/channels that correspond to the downlink data transmission channels of the satellite 40 over which the software applications originated by the Network Control Center 30 are broadcast.

The client 50 of the illustrative embodiment depicted in FIG. 2 further includes an input device 80, e.g., an illuminated keypad, and/or integrated trackpad or trackball and/or mouse and/or stylus-controlled touch-sensitive screen, or the like. The input

device 80 is coupled to an input processor 82 (e.g., a DSP) that is turn coupled to the processor 60. The client 50 further includes a display device 84, such as flip-up/flip-down LCD or other Flat Panel Display (FPD). The display device 84 is controlled by a display processor 86 (e.g. a DSP) that is coupled to the processor 60. Alternatively, the input processor 82 and/or the display processor 86 can be integrated into the processor 60 (e.g., as separate function units thereof).

The client 50 of the illustrative embodiment depicted in FIG. 2 further includes a local memory 88, which can, for example, be a Synchronous Dynamic Random Access Memory (SDRAM) or the like. The local memory 88 is coupled via a bus 90 to the processor 60. The local memory 88 should be sufficient to store control data needed by the control program running on the processor 60, such as menu and related information, and to store any broadcast software applications that are downloaded.

The client 50 of the illustrative embodiment depicted in FIG. 2 further includes a modem 93 coupled via a serial bus 95 to the processor 60. The modem 93 is preferably a wireless or cellular modem, such as the IP Minstrel sold by Novatel, that is adapted to establishing a two-way communications link, such as a full duplex cellular telephone connection, e.g., via a Cellular Telephone Network (CTN) 53 and a Public Switched Telephone Network (PSTN) 51, to the Network Control Center 30. As previously described, the two-way communications link preferably includes a forward channel that allows the client 50 to transmit user-specific data and/or requests to the Network Control Center 30, and a return channel that allows the Network Control Center 30 to transmit user-specific data and/or instructions/commands to the client 50, as required.

It will be readily apparent to those having ordinary skill in the pertinent art and access to the teachings of the present disclosure that a variety of different techniques can suitably be utilized to enable a user of the client 50 to request and download one or more selected ones of the broadcast software applications, and to manage and control this process. For example, the control program can provide a menu of the software applications that are available for downloading. The menu could also provide associated information such as estimated time required to download each software application, the different categories of software applications that are available for download (e.g., word processors, video games, spreadsheets, address books, calendars, etc.), and the like.

The channel over which each software application is broadcast can be stored in a look-up table in the local memory 88, with this channel information being retrieved by the processor 60 in response to the user selecting a particular software application for download,

e.g., via the input device 80. The processor 60 can then issue an appropriate control signal to the tuner controller 67 which, in response thereto, can tune the tuner/de-modulator 65 to the appropriate channel.

Alternatively, the processor 60, in response to the user selecting a particular application for download, can generate a request which can be transmitted by the modem 93 over the forward channel of the two-way communication channel to the Network Control Center 30. The Network Manager 35 within the Network Control Center 30 can then generate appropriate channel tuning instructions/commands for transmission by the modem bank 39 and via the return channel of the two-way communication channel to the client 50. The processor 60, in response to the channel tuning instructions/commands received from the Network Control Center 30, can then issue an appropriate control signal to the tuner controller 67 which, in response thereto, can tune the tuner/de-modulator 65 to the appropriate channel. Once downloaded, the software application can be stored in the local memory 88 and executed by the processor 60 in the normal manner.

As will be appreciated, with broadcast bitrates of 10 megabits/second or greater, particularly with communications taking place over a noisy/lossy transmission medium (e.g., air), there is the possibility of data corruption leading to unrecoverable data, i.e., uncorrectable bit errors. In this situation, the client could wait for a re-transmission of the selected software application, or, alternatively, the two-way communications link with the Network Control Center 30 can be used to recover the missing (corrupted) data, e.g., the request for the missing data can be transmitted to the Network Control Center 30 over the forward channel and the missing data itself can be transmitted by the Network Control Center 30 over the return channel.

In general, it should be recognized that the client 50 can suitably be implemented as any type of portable data communications device, such as a hand-held, palm-top, or notebook computing device, a PDA, and an intelligent cellular phone, or any other personal multimedia appliance or Network Computer (NC). The client 50 may also be provided with one or more communications ports (e.g., USB ports) to facilitate connection to one or more external multimedia products, such as a DVD drive, a CD-ROM drive, a CD player, or the like. Also, although the illustrative embodiment of the present invention has been described above in connection with a satellite broadcast system, it should be readily apparent that any suitable terrestrial air or cable broadcast system could be utilized. For example, a CATV broadcast network, a DBS broadcast network, an HDTV broadcast network, or other appropriate broadcast network could be utilized.

Users could be charged on a time-of-usage basis, on a subscription basis (e.g., monthly or annual subscription fee), on a per application downloaded basis, on a per use/transaction basis, or any other suitable basis. In fact, the service could be offered as a free service in conjunction with other services and/or subsidized by advertisers.

- 5 Although the present invention has been described in detail hereinabove, it should be appreciated that many variations and/or modifications of the basic inventive concepts taught herein which may appear to those skilled in the pertinent art will still fall within the spirit and scope of the present invention as defined in the appended claims.

CLAIMS:

1. A communications system (20), comprising:
a server system (33) that stores software applications;
a broadcast system (30, 35, 37, 40) that broadcasts the software applications;
and
5 a multiplicity of portable clients (50) that each include a receiver (61) having a
tuner (65) that is selectively tunable to receive a selected one of the software applications
broadcasted by the broadcast system (30, 35, 37,40) .
2. The communications system (20) as set forth in Claim 1, wherein the
10 broadcast system (30,35, 37,40) is a wireless broadcast system.
3. The communications system (20) as set forth in Claim 1, further comprising a
two-way communications link (51, 53) between the server system (33) and each of the
multiplicity of portable clients (50), wherein the two-way communications link (51, 53)
15 includes a forward channel over which the respective portable client (50) can transmit client
data to the server system (33), and a return channel over which the server system (33) can
transmit system data to the respective portable client (50).
4. The communications system (20) as set forth in Claim 3, wherein each of the
20 portable clients (50) further includes a modem (39) for establishing the two-way
communications link (51, 53).
5. The communications system (20) as set forth in Claim 4, wherein the modem
(39) of each o of the portable clients (50) is a wireless modem.
- 25 6. The communications system (20) as set forth in Claim 5, wherein the
broadcast system (30,35, 37,40) is a satellite direct broadcast system.

7. The communications system (20) as set forth in Claim 1, wherein the broadcast system (30,35, 37,40) broadcasts the software applications over different channels each occupying a different respective frequency band.
- 5 8. The communications system (20) as set forth in Claim 7, wherein the broadcast system (30,35,37, 40) is a satellite broadcast system.
9. The communications system (20) as set forth in Claim 7, wherein the tuner (65) of the receiver (61) of each of the multiplicity of portable clients (50) is selectively
10 tunable to any selected one of the plurality of different frequency bands in order to receive one or more selected one of the software applications broadcasted by the broadcast system (30, 35, 37, 40) .
10. The communications system (20) as set forth in Claim 8, further comprising a
15 two-way communications link (51, 53) between the server system (33) and each of the multiplicity of portable clients (50), wherein the two-way communications link (51, 53) includes a forward channel over which the respective portable client (50) can transmit client data to the server system (33), and a return channel over which the server system (33) can transmit system data to the respective portable client (50).
- 20 11. The communications system (20) as set forth in Claim 10, wherein the two-way communications link (51, 53) between the server system (33) and each of the multiplicity of portable clients (50) is a telephone connection.
- 25 12. The communications system (20) as set forth in Claim 1, wherein each of the portable clients (50) is a portable data communications device.
13. The communications system (20) as set forth in Claim 1, wherein each of the
30 portable clients (50) further includes a user-interface that enables a user to select one of the broadcasted software applications for downloading, and a processor (60) for executing the downloaded software application.
14. The communications system (20) as set forth in Claim 13, wherein:

the broadcast system (30, 35, 37, 40) broadcasts the software applications over different channels each occupying a different respective frequency band; and,

the tuner (65) of the receiver (61) of each of the multiplicity of portable clients (50) is selectively tunable to any selected one of the plurality of different frequency bands in order to receive one or more selected one of the software applications broadcasted by the broadcast system (30, 35, 37, 40) .

15. The communications system (20) as set forth in Claim 14, further comprising a two-way communications link between the server system (33) and each of the multiplicity of portable clients (50), wherein the two-way communications link includes a forward channel over which the respective portable client (50) can transmit client data to the server system (33), and a return channel over which the server system can transmit system data to the respective portable client (30).

16. The communications system (20) as set forth in Claim 15, wherein the broadcast system (30,35, 37, 40) is a satellite broadcast system.

17. The communications system (20) as set forth in Claim 16, wherein each of the portable clients (50) further includes a modem (39) for establishing the two-way communications link (51, 53).

18. The communications system (20) as set forth in Claim 15, wherein the system data includes instructions for supervising the downloading of software applications.

19. The communications system (20) as set forth in Claim 15, wherein the client data includes requests for unrecoverable software application data, and the system data includes the unrecoverable software application data.

20. The communications system (20) as set forth in Claim 15, wherein the client data includes client software download request data, and the system data includes download control data issued in response to the client software download request data.

21. A portable data communications device (50), comprising:

a receiver (61) that includes a tuner (65) that is selectively tunable to receive a selected one of a plurality of software applications broadcasted by a broadcast system (30, 35, 37, 40);

a user-interface (80, 84) that enables a user to select one of the broadcasted software applications for downloading;

a processor (60) for executing the downloaded software application.

22. The portable data communications device (50) as set forth in Claim 21, further comprising a control program executed by the processor (60) for controlling the tuner (65).

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23. The portable data communications device (50) as set forth in Claim 21, further comprising a modem (39) for establishing a two-way communications link (51, 53) with a network control system (30), wherein the two-way communications link (51, 53) includes a forward channel over which the portable data communications device (50) can transmit client data to the network control system (30), and a return channel over which the network control system (30) can transmit system data to the portable data communications device (50).

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24. The portable data communications device (50) as set forth in Claim 21, wherein the broadcast system (30, 35, 37, 40) is a satellite direct broadcast system.

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25. The portable data communications device (50) as set forth in Claim 23, wherein the modem(93) is a wireless modem.

26. The portable data communications device (50) as set forth in Claim 25,

25 wherein the broadcast system (30, 35, 37, 40) is a satellite direct broadcast system.

27. The portable data communications device (50) as set forth in Claim 23, wherein the system data includes instructions for supervising the downloading of software applications.

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28. The portable data communications device (50) as set forth in Claim 23, wherein the client data includes requests for unrecoverable software application data, and the system data includes the unrecoverable software application data.

29. The portable data communications device (50) as set forth in Claim 23, wherein the client data includes client software download request data, and the system data includes download control data issued in response to the client software download request data.

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30. The portable data communications device (50) as set forth in Claim 21, wherein:

the broadcast system (30, 35, 37, 40) broadcasts the software applications over different channels each occupying a different respective frequency band; and,

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the tuner (65) is selectively tunable to any selected one of the plurality of different frequency bands in order to receive the selected one of the software applications broadcasted by the broadcast system (30, 35, 37, 40).

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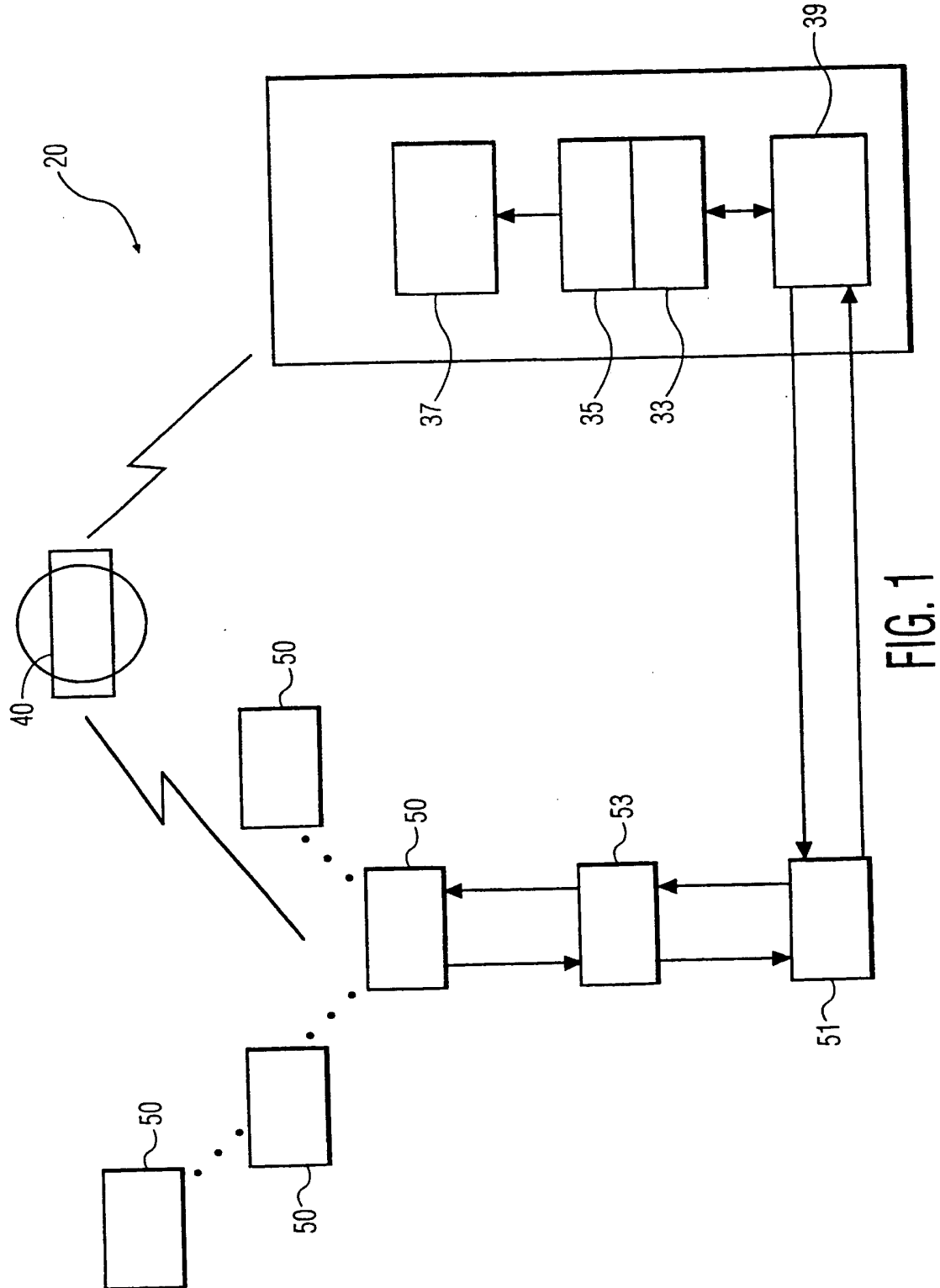
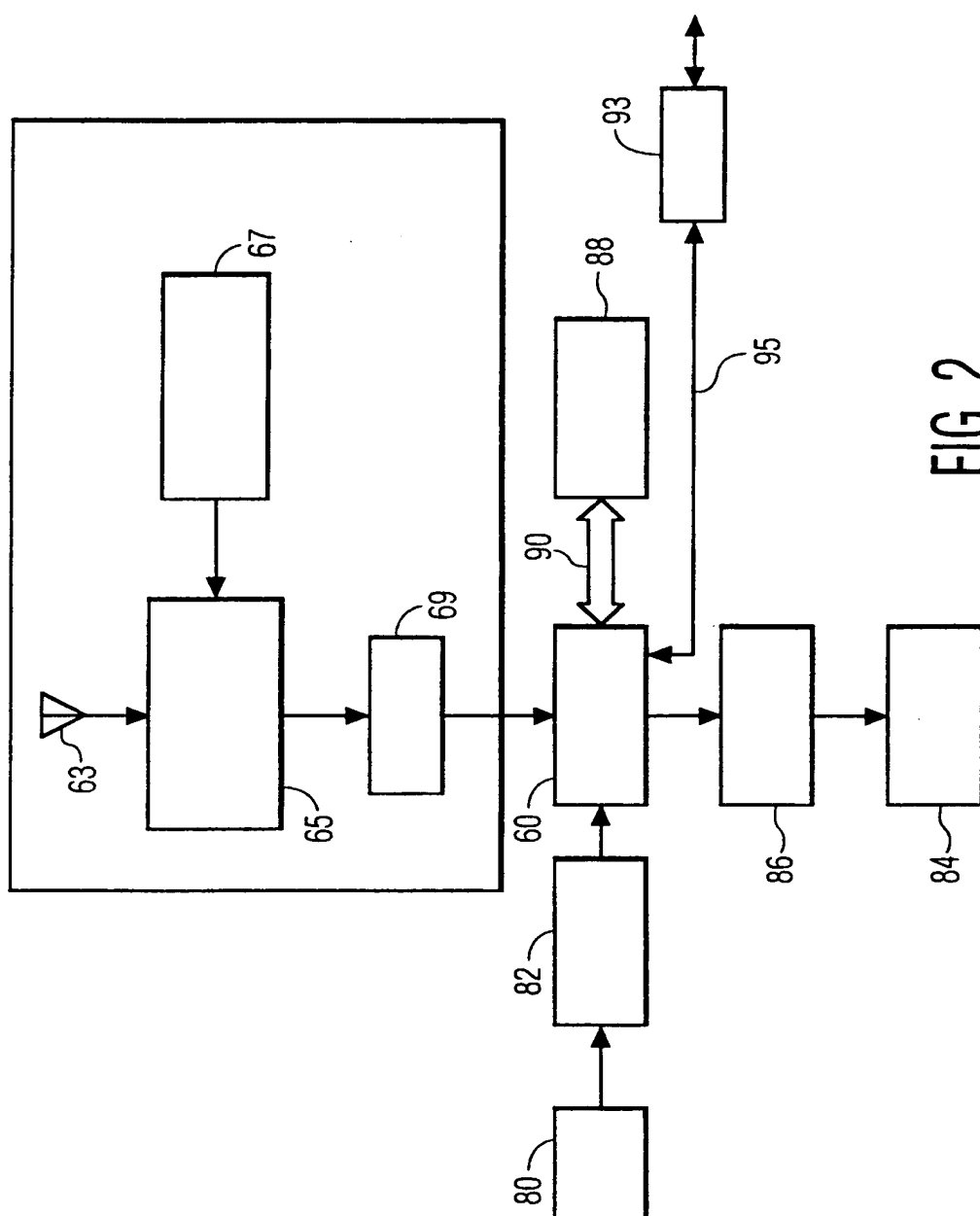


FIG. 1



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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(57) Abstract: A communications system consisting of a server system that stores software applications, a broadcast system that broadcasts the software applications, and a multiplicity of portable clients that each include a receiver having a tuner that is selectively tunable to receive a selected one of the software applications broadcasted by the broadcast system. Each of the portable data communications devices includes a receiver that has a tuner that is selectively tunable to receive a selected one of a plurality of software applications broadcasted. In one embodiment, the broadcast system broadcasts the software applications over different channels each occupying a different respective frequency band, and the tuner is selectively tunable to any selected one of the plurality of different frequency bands in order to receive the selected one of the broadcasted software applications.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 20724 A (STARGUIDE DIGITAL NETWORKS) 22 May 1998 (1998-05-22) page 18, line 2 - line 15 page 26, line 10 - line 17 page 28, line 6 - page 30, line 5 page 42, line 1 - line 6 page 50, line 9 - page 54, line 11 -----	1-30

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Date of the actual completion of the international search

3 May 2001

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INTERNATIONAL SEARCH REPORT

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